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vessel.

during said process introducing additional said sample into said

REMARKS

The Office Action dated July 16, 2002, has been carefully reviewed, and the application amended in order to place the same in condition for allowance.

Reconsideration of the prior claim objections and rejections and allowance of the amended claims are respectfully requested on the basis of the following remarks. A marked version of the amended claims showing the changes is attached hereto.

The Invention

The present invention has solved a long standing previously unsolved problem in respect of microwave assisted chemical analysis.

More specifically, as set forth in greater detail, at page 1, line 19 through page 3, line 18 of the specification, serious difficulties involved with microwave heating in chemical analysis, due to the undesired buildup of pressure and temperature within the microwave heated vessel. It is known that the increased temperature is required in order to enhance the reaction rate, but the pressure buildup which results, presents an undesired hazardous situation.

In a present invention, a sample is provided within the vessel and heated by microwave energy in order to volatilize at least a portion of the sample to establish a gas phase. The gas phase is cooled while continuing to heat the sample by microwave energy. After removal of at least a portion of at least one of the gas phase and the unvolatilized portion of the sample, the unvolatilized portion is analyzed to determine the composition thereof. All of these features are recited in amended independent Claim 1, which is the sole independent claim.

As will be apparent from what follows, neither prior art reference, considered alone or in combination, teaches or suggests the simultaneous heating of a sample to establish a gas phase which is cooled simultaneously with the continued heating of the sample by microwave energy. These features are recited in amended Claim 1, which is the sole of independent claim in their group being prosecuted in this application.

Claim Objections – Claims 2, 4, 6, 8, 11, 12, 15 and 17

With one exception, the Examiner's much appreciated suggestions have been adopted with appropriate amendments being made to the claims. As to Claim 2, the word "said" appears at three locations. Certain assumptions have been made in

selecting which occurrence was to be amended. If the assumption is incorrect, it would be appreciated if the Examiner would provide additional guidance.

Section 103 – Claims 1-19

These claims were rejected on the basis of Haswell 5,215,715 in view of Kingston reference (AA in the Information Disclosure Statement received May 10, 1999).

Haswell discloses a continuous flow microwave heated digesting system. The material to be digested is passed in a liquid through a microwave heating zone wherein bubbles are formed, followed by cooling apparatus. The bubbles are commingled with the liquid and material to be digested, and in effect are a byproduct of the continuous process. The bubbling is said to promote digestion of the material in the liquid while being heated with the bubbles condensing when the material reaches the cooling zone. This system is totally distinguishable from applicant's method as recited in independent Claim 1. As a result of the continuous flow and commingling of the volatized material, i.e., bubbles, with the liquid and material to be digested, there is not only no teaching or suggestion, but also no capability of "cooling of said gas phase while continuing to heat said sample by said microwave energy." Applicant clearly teaches a method having such capabilities. Further, there is no ability in Haswell to remove at least one of the gas phases or at least a portion of the unvolatilized material from the vessel to facilitate analyzing the unvolatilized portion of the sample in order to determine the composition thereof.

Kingston has been cited as teaching closed vessel microwave digestion and microwave energy of frequency of 2450 MHZ. Kingston, while disclosing the features the Examiner has recited, is also lacking the above described capabilities in respect of cooling the gas phase while continuing to heat the sample by microwave energy, and the removal of at least one of the gas phase or at least portions of the unvolatilized portion before analyzing.

As a result of the foregoing, a combination of Kingston and Haswell, even though neither contains a specific suggestion regarding such combination, would also be totally devoid of the above recited teachings as set forth in independent Claim 1.

It is respectfully submitted that amended independent Claim 1 is patentable over the Haswell and Kingston references whether considered individually or in the suggested combination.

Dependent Claims 2-19

Claim 2 which depends from Claim 1 specifically recites employing the method on a sample containing silicon, and that the unvolatilized portion includes trace elements which were contained in the silicon containing sample. Details regarding the specific embodiment having a sample containing silicon are provided in Example 2 beginning on page 19, line 10 of the specification. No such teaching or suggestion is contained within the applied references.

The features of independent claims 3 and 4 are not asserted as having as independently contributing to patentability apart from their dependency respectively from Claims 2 and 1.

Claim 5 recites that it is at least a portion of the gas phase that is removed from the vessel. For reasons stated hereinbefore, that is not taught or suggested by the applied prior art.

The feature of dependent Claim 6 is not asserted as contributing to patentability apart from its dependency from independent Claim 1.

Claim 7 recites the use of polycrystalline silicone as the sample. This is not taught or suggested by the applied art.

With respect to the Examiner's statement that Claims 8 and 10 are a matter of choice and design, this statement is respectfully traversed. As described in respect of the examples presented in connection with Figures 5 and 6, the use of two distinct compartments each having a different acid as set forth in Claim 8, and as discussed in respect of the chemistry disclosed beginning on page 21 show the advantageous use of this configuration. Similarly, the separation of acids recited in Claim 9 which depends from Claim 8, and the distillation sequence facilitated by the two compartments as recited in Claim 10 are all respectfully submitted to be patentable.

The features of dependent Claims 11, 12 and 13 are not asserted as contributing to patentability apart from their dependency from directly or indirectly from Claim 1.

Dependent Claim 14 recites during the heating process introducing additional sample into the vessel. In view of the fact that Haswell is a continuous flow by procedure, the portion of the liquid which contains the material to be digested and evolves bubbles being heated by the microwave, does not provide means for introducing additional sample into the region.

Claims 15 and 16 are not asserted as contributing additional unique features, but rather are asserted as being patentability through the respect of dependencies from Claims 14 and 1.

Claim 17 which depends from Claim 8 recites during the process introducing additional sample into the vessel. The prior art does not have this capability and does not teach or suggest a means for doing the same.

Dependent Claim 18 recites during the process withdrawing at least a portion of the gas phase from the vessel. The prior art does not teach or suggest such an approach and is not capable of the same.

Claim 19 depends from Claim 2 and recites effecting substantially complete retention in the unvolatilized portion of all of the trace elements. The prior art would not teach one to retain in the unvolatilized portion which is subjected to microwave heating the trace elements while volatilizing and cooling the gaseous phase.

It is respectfully submitted that the foregoing reasons amended Claims 1 – 19 are allowable over the prior art.

SUMMARY AND CONCLUSION

In view of the modification to eliminate the objected to language coupled with the clarifying amendments and foregoing distinctions over the art, it is respectfully submitted that Claims 1-19 are now in proper form for issuance of a Notice of Allowance and such action is respectfully requested at an early date.

Respectfully submitted,



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Date _____